12.1 CATARACT

AEROMEDICAL CONCERNS: Cataracts reduce visual acuity (VA). When the cataract involves the visual axis, visual acuity is most affected in bright sunlight and conditions of glare.

WAIVER: The condition is considered disqualifying. Once vision has deteriorated to less than 20/20 correctable or the patient has a positive Glare test, the flier should be disqualified from flying until successful surgical removal of the cataract. Waiver to SG2 or SG3 may be considered after surgery provided the VA returns to 20/20 corrected, is within refraction limits, and the Glare test is negative (normal).

INFORMATION REQUIRED:

1. Ophthalmology consultation is required for initial waiver request.
2. Because of the potential for deterioration, ophthalmologic follow-up may be needed every 6 months until surgery is deemed necessary.
3. Prior to and after surgery, a Mentor Brightness Acuity Test (BAT, a glare-testing device) should be performed with VA documented for each eye separately at the low, medium and high settings.
4. Confirmation is needed of exclusion of underlying pathology such as Wilson's disease, diabetes or hypoparathyroidism.

TREATMENT: Surgery with intraocular lens (IOL) implant usually provides a sufficiently acceptable VA result for military flying duties. Consultation with NOMI ophthalmology prior to surgery is recommended.

DISCUSSION: The visual effect of a cataract depends on its encroachment on the visual axis and the proximity to the nodal point. A posterior subcapsular cataract can have a devastating effect on vision. 2 to 3 episodes of serious dehydration can increase the risk of developing a cataract 21 fold. Surgical success of greater than 90% in achieving a 20/40 best corrected VA after 1 year has been reported. The RAF restricts the flying of personnel with IOL from high performance aircraft and helicopters. This is because of the risk of pressure on ciliary body blood vessels under high Gz or vibration and because of the unknown long term effect on the corneal epithelium.

ICD-9 CODES:

366 Cataract
366.1 Posterior Sub-Capsular Cataract (senile)
366.20 Traumatic Cataract
366.45 Drug induced Cataract
743.30 Congenital Cataract

12.2 COLOR VISION ABNORMALITIES

AEROMEDICAL CONCERNS: Normal color vision is required to accurately identify warning lights and color visual displays in the cockpit, external visual cues including airfield lighting, the Fresnel lens, aircraft formation lights. Interactions with other optical devices, such as laser protective visors, may compound a given problem.

WAIVER: Applicants are CD, no waiver. Waivers have been granted for flight surgeons, aerospace physiologists and other selected Class 2 aircrew on a case-by-case basis. Waivers for a change in color vision in designated personnel are usually granted if not due to ocular pathology.

INFORMATION REQUIRED:

1. Following a conference with the Air Force on vision standards and procedures, the Pseudo-Isochromatic Plates (PIP) are the preferred primary test.
    a. For the Navy, 12 of 14 correctly identified plates constitute a passing score. The preferred lighting is the MacBeth lamp. If one is not available, a daylight fluorescent bulb may be used. Do not use incandescent lighting as this may allow persons with mild deuteranomalous (green weak) deficiencies to pass. Passing criteria is 12 or more plates correctly read, i.e., no more than 2 errors. Record the findings as the number of plates correctly read out of 14. For example: PIPs 13/14 correct "PASS" or PIPs 9/14 correct "FAIL".
2. If member cannot pass the PIP, the FALANT may be administered as an alternative, if available.
    a. Passing criteria for FALANT remain 9/9 or 16/18 correct responses.
3. If a designated crewmember fails both, evaluation is required to screen for acquired pathology, as well as a test of demonstrated ability, usually performed with the flight surgeon and safety officer as observers.

TREATMENT: N/A.

DISCUSSION: Defective color vision is usually congenital. In Caucasians, approximately 8% of males have inherited color defective vision and approximately 2% are dichromats with severe deficiency. The largest group is actually trichromatic, actually color weak rather than color deficient. Dichromatics are protanopes if they have a red-green deficiency related to red-sensitive cone loss, deuteranopes if they are red-green deficient related to green-sensitive cone loss and tritanopes if they have blue-yellow deficiency related to blue-sensitive cone loss. Deuteranopes and protanopes have difficulty interpreting VASI lights' red-white color relationship. Protanopes have difficulty interpreting red high speed taxiway exit and runway end marker lights. At night, dichromats may be further reduced to monochromaticity when the physiological phenomenon of small field tritanopia is added; this is of relevance in distinguishing navigation and anti-collision lights. Color vision can be affected after optic neuritis or in macular degeneration, central serous retinopathy, and multiple sclerosis or as a sequela to heavy metal poisoning. Some color vision deficiencies are acceptable, the most problematical being red/green abnormalities.

ICD-9 CODES:
368.5 Color Vision Abnormalities

12.3 DECREASED VISUAL ACUITY

AEROMEDICAL CONCERNS: Decreased visual acuity degrades lookout and target acquisition.

WAIVER: Waiver for visual acuity less than standards may be considered in designated individuals, provided the central and peripheral retina is normal and all other visual standards are met.

Category	Unaided Visual Acuity	Refractive Limits	NATOPS Restrictions
SG1	20/400 or better each eye	No refractive error limits	None
SG2	20/400 or better each eye	None	* Restricted from shipboard duties including VSTOL * Helicopters OK
SG3	20/400 or better each eye	None	* Dual Controlled only * Requires SG1 or 2 onboard * Separate Pilot in Command Waiver required

Consider whether a waiver is actually required. For all three Service Groups, unaided visual acuity requirements are now the same; aviators are required to have 20/400 vision or better in each eye. An aviator whose vision is worse than 20/400 will need a waiver to fly in any Service Group; clear justification is required, including primary type of aircraft in which he or she will be flying and the number of hours in that type of aircraft. Remind your aviators that SG3 Pilot in Command waivers are addressed to CNO (N889) and are valid only for the current command. Refer to OPNAVINST 3710.7 Chapter 8 Section 5 for further details.

INFORMATION REQUIRED:

1. Optometry or ophthalmology consults for any waiver request for refractive error.
2. Ophthalmology consult required for cases of decreased visual acuity not due to simple myopia, hyperopia, astigmatism or presbyopia.
3. Obtain retinal evaluation at corrections greater than -5.50 diopters.
4. Progressive astigmatism should be evaluated to exclude keratoconus.

TREATMENT: Refraction by spectacles within the limits set by MANMED Chapter 15. Contact lenses are permissible for aviation personnel, but spare clear spectacles must be carried in flight and the aviator must demonstrate 20/20 with contact usage. Radial keratotomy, LASIK,

or other corneal surgical procedures for the correction of myopia is CD, no waiver. NAMI ophthalmology should be consulted for applicants who have had or are suspected of having excimer laser photorefractive keratotomy (PRK).

DISCUSSION: Myopia is usually a progressive condition, stabilizing around age 30. Significant myopia is complicated by considerable visual distortion at the periphery of corrective lenses. Individuals with significant myopia may see halos or flares around bright lights at night and are more at risk for night blindness. Elongated globes are at an increased risk of retinal detachment and of lattice degeneration. Whenever a prescription is changed, aircrew should be warned about transient visual distortion and counseled on the period of adjustment. Evidence suggests that there is no difference in civil accident rates or in naval carrier landing accidents in pilots who require visual correction. Severe myopia tends to be a problem pertaining to Class 2 personnel since the entry requirements for other pilots tend to be sufficiently stringent to exclude those whose vision would deteriorate that much. The risk of retinal detachment in normals is 0.06% over 60 years compared to 2% in 5 diopter myopes. Beyond -9.75 diopters, the risk increases to 24%. Recent studies of radial keratotomy suggest that the procedure leaves 28% of the eyes with unstable refraction and nearly all with glare problems.

ICD-9 CODES:
367.9 Decreased Visual Acuity
367.9 Ametropia [Includes Myopia and Hyperopia]
367.95 Ametropia, exceeding standards
368.0 Amblyopia

12.4 DEFECTIVE DEPTH PERCEPTION

AEROMEDICAL CONCERNS: Although many visual cues regarding the relative positions of object in space (depth perception) are monocular, the binocular visual reflex of stereopsis is an important indicator of normal visual acuity in each eye, normal ocular alignment and normal binocular visual development. Defective stereopsis may make certain piloting duties such as formation flying and aerial refueling more difficult.

WAIVER: No waivers shall be recommended for any candidate or designated Class I duty involving actual control of aircraft. Class II and III personnel must meet standards for depth perception except when remarked as "not required" under types of aviation duty specified under MANMED Articles 15-87 through 15-99.

INFORMATION REQUIRED:

1. Valid tests of stereopsis include:
    a. **Armed Forces Vision Tester (AFVT**)
    b. **Verhoeff Stereoptor**
    c. **Stereoacuity Plates** used with polarized viewers such as the Stereo Optical or Titmus Optical **Stereo Fly** or **Randot**.
2. Although the devices test stereopsis at optical infinity, intermediate or near distance-respectively-a pass of any one test meets the stereopsis standard. The tests must be administered and results recorded as specified in MANMED and elsewhere in the ARWG.
3. Recent loss of stereopsis in a designated Class I naval aviator is usually due to a change in refraction or onset of presbyopia, but may also be a sign of cataract, macular or optic nerve disease or new motility disturbance.
4. New failures to meet the stereopsis standard must be evaluated by an ophthalmologist including completion of the ocular motility worksheet as specified by the attached instructions found elsewhere in the ARWG.

TREATMENT: Correct any underlying refractive error or eye disease.

DISCUSSION: Defective stereopsis is typically innate and due to abnormal visual development prior to the age of 9. Causes of defective stereopsis include abnormal ocular muscle balance, amblyopia, anisometropia, microtropia, and monofixation syndrome.

ICD-9 CODES:
368.33 Defective Depth Perception

12.5 HISTORY OF STRABISMUS SURGERY

AEROMEDICAL CONCERNS: Single, fused, simultaneous binocular vision in all versions at all times with the stereopsis reflex active is a requirement for safe and effective duty involving actual control of aircraft. Congenital or acquired defects of ocular alignment as well as any surgery to correct ocular misalignment present a grave hazard to normal binocular vision.

WAIVER: History of strabismus surgery is considered disqualifying for all aviation duty. Waiver will not be considered for SNA applicant. Waiver for aviation duty other than SNA applicant will be considered on a case-by-case basis no sooner than six months after successful and stable strabismus surgery if post-operatively the member otherwise meets the visual standards appropriate for his or her duty.

INFORMATION REQUIRED:

1. Submission must include an ocular motility worksheet completed at the time of waiver request by a provider qualified to measure all required data.
2. Include copies of all eye exams and operative report(s) with AMS.

TREATMENT: Strabismus surgery involves enhancing or retarding the action of one or more extraocular muscles in either or both eyes. An extraocular muscle tendon may be shortened (resection) to strengthen its action, or the insertion of the muscle moved posteriorly on the globe (recession) to weaken its action. Suspending the tendon on hangback sutures is an alternative to traditional recession surgery. Adjustable sutures may be employed to fine tune ocular alignment in the perioperative period. A spacer may be inserted in the muscle tendon with unusual forms of vertical muscle surgery. In general, vertical muscle strabismus surgery is more complex and problematic than horizontal muscle surgery for simple eso- or exotropia.

DISCUSSION: Ocular misalignment is always the consequence of disease and never a normal finding. Surgery on extraocular muscles is imprecise and has a risk of regressing to the original state of misalignment or progressing in effect and causing sequential overcorrection. Multiple surgeries are frequently necessary for congenital misalignment. Scarring of the globe and adnexa after muscle surgery may lead to restricted ductions. Vertical muscle surgery often causes or does not fully correct cyclotorsional misalignment.
Realignment of the eyes with muscle surgery does not resolve the underlying disorder in congenital misalignments and while peripheral binocular function may be partially enhanced, normal central binocular visual development and stereopsis are rarely achieved. Even after satisfactory surgical alignment in congenital esotropia, residual comorbidities such as latent nystagmus and dissociated vertical deviations are often seen. The desirable cosmetic result after strabismus surgery is 10 or fewer prism diopters of misalignment since this relatively small degree of tropia is not noticeable to casual observation of the eyes. Asymptomatic vision with tropia less than 10 prism diopters meets the NOHOSH standard for Class II and III.

ICD-9 CODES:
H153 Surgery for strabismus or ocular muscle imbalance

12.6 EXCESSIVE PHORIAS

AEROMEDICAL CONCERNS: Excessive phorias are frequently associated with defective stereopsis and/or diplopia, a devastating state if this occurs during a critical phase of flight.

WAIVER: CD for Class I aviators. No waivers are considered.

INFORMATION REQUIRED:

1. Evaluation by an eye professional or an ophthalmologically proficient flight surgeon is necessary.
2. The consult should address any history of diploplia or previous eye surgery, and include all the studies requested on the accompanying ocular motility worksheet.

ICD-9 CODES:
378.4 Excessive Phorias
378.41 Esophoria
378.42 Exophoria
378.43 Hyperphoria

12.7 DETACHED RETINA /CENTRAL SEROUS RETINOPATHY

AEROMEDICAL CONCERNS: A detached or torn retina can lead to visual impairment, the seriousness of which depends on the part of the retina involved and the success of therapy. Routine exposure to G forces has not been shown to increase the risk of retinal detachment.

WAIVER: Waiver can be considered if the aviator has normal vision, without complication.

INFORMATION REQUIRED:

1. Ophthalmological evaluation is required for retinoschisis, retinal tears or central serous retinopathy.

TREATMENT: Diathermy, photocoagulation, cryotherapy, scleral buckling or laser therapy are acceptable treatments for retinal detachment or tears. The duration of central serous retinopathy may be shortened and the incidence of further attacks reduced by laser photocoagulation. Usually no treatment is required for retinoschisis unless rhegmatogenous detachment occurs.

DISCUSSION: With surgical treatment, permanent reattachment of the retina occurs in up to 90% of uncomplicated cases. If the macula is involved the resulting vision is likely to be of the order of 20/200. The risk of retinal detachment in the other eye has been quoted as up to 13% at a mean interval of 5.7 years. Retinoschisis occurs in 3% of the population, with increasing frequency from the second decade. The final outcome of central serous retinopathy (choroidopathy) seems unaffected by the duration of the condition, the initial visual acuity or the age of the patient. Recurrences are frequent and approximately 20% of patients have the condition for more than 6 months.

ICD-9 CODES:
361.0 Retinal Detachment with retinal defect
362.41 Central Serous Retinopathy

12.8 GLAUCOMA & OCULAR HYPERTENSION

AEROMEDICAL CONCERNS: Glaucoma is typically asymptomatic, but early signs may include a slow progressive loss of contrast sensitivity and loss of central or peripheral visual fields. Patients with Acute Angle Closure Glaucoma may present with night vision problems such as halos and flares around lights.

WAIVER: Intraocular pressures (IOPs) above 22 mm Hg as confirmed by applanation tonometry are CD with a diagnosis of elevated IOPs; pressures above 30 mm are defined as glaucoma for aviation purposes. Both require a waiver per MANMED standards. Waivers may be granted if visual field loss is minimal and intra-ocular pressure is controlled at normal levels without miotic drugs. Miotic drugs are incompatible with night operations due to the inability of the pupil to dilate to admit sufficient light.

INFORMATION REQUIRED:

1. Quarterly measurements of IOP are required for renewal unless the ophthalmologist specifies less frequent assessment.
2. Document the patient's blood pressure and heart rate response to medications in prone and standing (after 2 minutes) positions.
3. IOPs must be documented from a Goldman's applanation tonometer, not from a non-contact tonometer "puff test".
4. Waiver requests must be accompanied by:
    a. Dilated fundus examination (to include comment on the cup-to-disc ratio)
    b. Humphrey visual field test battery(30-2, 24-2)
    c. Slit lamp examination
    d. Gonioscopy
5. The waiver process will be facilitated if optic disk photographs are included with the request.

TREATMENT: For open angle glaucoma, topical epinephrine derivatives or topical beta-adrenergic blockers such as Timoptic are acceptable provided there are no aeromedically significant side effects. Side effects may be minimized by pinching off the lacrimal duct on administration in order to limit systemic absorption. Waiver can be considered for successful surgical treatment of closed angle glaucoma.

DISCUSSION: Intraocular pressure between 22 and 30 mm Hg does not necessitate treatment but regular (every 3 to 6 months) ophthalmologist/optometrist review is essential. If the patient has changing cup to disk ratios or deteriorating visual fields with pressures less than 30 mm Hg then treatment will be necessary. Most treated glaucoma patients can maintain visual acuity while on therapeutic ocular medications. This is a difficult area because a clinical ophthalmologist's perspective of a successful treatment may not be adequate for the additional demands of the aviation environment.

ICD-9 CODES:
365 Glaucoma & Ocular Hypertension

365.04 Ocular hypertension
365.10 Open angle glaucoma
365.20 Closed angle glaucoma

12.9 KERATOCONUS

AEROMEDICAL CONCERNS: Blurred vision can interfere with flying. There is a long term risk of corneal scarring.
WAIVER: Waiver may be possible in the early stages of keratoconus provided visual standards are met.

INFORMATION REQUIRED:
1. Ophthalmological and optometric consultations are necessary.
2. Exclusion of connective tissue disorders such as Marfan's or Ehlers-Danlos syndromes may be indicated.

TREATMENT: None acceptable for Naval aviation. Patients whose best corrected acuity falls below 20/20 or those requiring corneal transplant will be disqualified from flying.

DISCUSSION: The syndrome is usually bilateral but may rarely affect one side only. The symptoms usually start in the teens. The condition has been reported to be slowly progressive in 22.5% of cases but stabilization can occur at any time. It is very difficult to diagnose keratoconus in the early stages unless a corneal topographic mapping apparatus is used. Aviators with rapidly increasing myopia or astigmatism may warrant such testing.

ICD-9 CODES:
12.14 Keratoconus

12.10 OCULAR HISTOPLASMOSIS

AEROMEDICAL CONCERNS: The maculopathy that occurs in ocular histoplasmosis syndrome can lead to legal blindness. Performing the Valsalva maneuver can cause leakage into the maculopathy. Hemorrhages can occur in the fundus at high altitudes.

WAIVER: Waiver is possible provided visual acuity is normal. If histoplasmosis spots are present in the macular area the patient should be grounded. In cases with many histoplasmosis spots it may be wise to consider restricting the flier from unpressurized flight over 8,000 feet.

INFORMATION REQUIRED:

1. Ophthalmology consultation is required.

TREATMENT: Laser photocoagulation to limit exudation and prevent serous retinopathy is compatible with flying status. Patients should not be on flying status while taking steroids should these prove necessary.

DISCUSSION: 99% of histoplasmic infections are benign. Up to 2% of adults in the □idwest have histoplasmosis spots disseminated in the fundus. The spots are more frequent in left than right eyes, but they are bilateral in 67% of patients. Some studies have reported 60% of patients with macular involvement become legally blind. If spots are present in the area of the disc, the risk of a symptomatic attack in the next 3 years is 20%; if none are present, the risk declines to 2%.

ICD-9 CODES:

12.14 Ocular Histoplasmosis

12.11 RETINAL VEIN OCCLUSION

AEROMEDICAL CONCERNS: Symptoms range from mild peripheral visual blurring to severe visual field loss.

WAIVER: The granting of a waiver will depend on the resultant visual acuity and the absence of other pathology.

INFORMATION REQUIRED:

1. Ophthalmology consultation is necessary with confirmation that the visual acuity meets standards and that neovascular glaucoma has not developed.
2. Exclusion of other pathology such as hypertension, diabetes, blood dyscrasias, multiple myeloma and dysgammaglobulinemia is required.

TREATMENT: Photocoagulation is sometimes useful in central retinal vein thrombosis and in long-standing cases of branch retinal vein occlusion.

DISCUSSION: Macular edema occurs in 57% of cases of occlusion of the temporal branch of the retinal vein. Visual acuity improves in 60% of patients with branch retinal vein occlusion and 50% achieve visual acuity of 20/40 or better within 1 year. In central retinal vein occlusion, neovascular glaucoma develops in 15% of cases.

ICD-9 CODES:
362.3 Retinal Vein Occlusion

12.12 UVEITIS

AEROMEDICAL CONCERNS: The acute condition can cause distracting pain in the eye. Floaters, excessive tearing, photophobia and blurred vision can occur. Long term sequelae include cataract, glaucoma, retinal damage, corneal band keratotomy and loss of vision.

TREATMENT: Patients should be grounded during the active phase of the disease and while treatment is continuing.

DISCUSSION: The association with sarcoidosis, ankylosing spondylitis and Reiter's syndrome only accounts for 5% of all cases of uveitis. Up to 20% of all cases of ankylosing spondylitis will have uveitis, often presenting with the condition. The anterior uveitis of herpes zoster occurs in 40% of patients with ocular involvement and can last for 2 years. Toxoplasmosis or syphilitic uveitis is rare in adults but can occur.

ICD-9 CODES:
364.3 Uveitis

12.13 PTERYGIUM

AEROMEDICAL CONCERNS: The progressive encroachment upon the cornea can lead to progressive astigmatism with difficulty correcting with spectacles. Additionally, encroachment upon the visual axis will lead to excessive glare and decreased contrast sensitivity. Pterygiums 3mm and less rarely encroach upon the visual axis.

WAIVER: Ptyergiums up to and including 1.0 mm corneal invasion (measured from the limbal border) are NCD for both applicants and designated aviation personnel. This is providing vision corrects to 20/20 with spectacles. Designated aviation personnel having pterygiums greater than 1.0 mm but less than 3.0 mm are CD but a waiver will be considered if vision corrects to 20/20 with spectacles. An ophthalmology or optometry consult will be required, and the pterygium measured by color corneal photography. Aviation applicants with pterygiums greater than 1.0 mm are NPQ with waiver not recommended.

ICD-9 CODES:
372.4 Pterygium

12.14 OCULAR MOTILITY WORKSHEET

Ocular Motility Worksheet		
Pertinent History		
Distant OD 20/ **Visual**	**Manifest** OD_____Corrected to 20/ **Refraction** OS_____ Corrected to 20/	
Cycloplegic **Refraction**	OD_____ 20/ OS_____20/	**Habitual Rx** OD_____ OS_____
Correction used for remainder of examination q Habitual q Manifest q None		
_____ _____ **Cover Test** Far: Near (all gazes)	_____ _____ (all gazes)	
Extraocular Motility	**Maddox Rod or Von Graefe**	**Stereopsis (Verhoeff)**
Worth 4 Dot @ 20 feet	**Vectograph** (anti-suppression)	**Red Lens Test**
4D Base Out (microstrab)	**Other test results (as applicable)**	
Impression:		**Is patient NOHOSH?** ☐ Yes ☐ No
Provider	**Provider Phone Number**	**Date**
Patient Name		**SSN**
Rank/Rate	**Unit/Address**	

IF YOU HAVE ANY QUESTIONS REGARDING THE EXAMINATION OR HOW TO FILL OUT THIS WORKSHEET, PLEASE CALL NOMI OPHTHALMOLOGY AT DSN 922-4558 OR COMMERCIAL (904) 452-4558.

PERTINENT HISTORY: Explain why the work-up is being done. For example: "scored 7 esophoria on AFVT" or "muscle surgery OS at age 6 years."

REFRACTION: SNAs and SNA applicants need a cycloplegic refraction recorded, all others require a manifest refraction. SNAs and SNA applicants who see less than 20/20 unaided also require a manifest refraction recorded.

HABITUAL RX: Record the subject's habitual Rx here if different from the manifest. If none is used, or the subject wears contact lenses, please note on the form.

COVER TEST: Report **numerical** values. Use a prism bar or loose prisms. Do horizontal and/or vertical as applicable to the case. Horizontal limits are approximately 45 degrees to the left and right of center. Vertical limits are approximately 25 degrees above and 35 degrees below center. Limits may need to be modified as dictated by the size of the nose and brow.

EXTRAOCULAR MOTILITY: Give description, such as "Smooth and full."

MADDOX ROD/VON GRAEFE: Report **numerical** values for **both** horizontal and vertical phorias. Fixation target must be at 20 feet.

STEREOPSIS: Verhoeff, done at 1 meter in a normally lit room, is currently the only acceptable test. Neither the device nor the patient should move during the test.

WORTH 4 DOT: Perform at **both** distance and near. Report "fusion," "diplopia," or "suppression OD/OS."

VECTOGRAPH: Test on the 20/40 (V O C S R K 4) line of the A.O. Vectographic slide. Report any suppression, and which eye is suppressing. If there is no suppression, state so.

RED LENS TEST: Test all 9 position of gaze, just like the cover test. Report any diplopia. If no diplopia is reported, state so.

4D BASE OUT TEST: Used to augment the A.O. Vectograph in the diagnosis of microstrabismus. This test is not always applicable and may be left blank if not used.

NOHOSH = **N**o **O**bvious **H**eterotropia **o**r **S**ymptomatic **H**eterophoria. Answer this question if the subject is NPQ (Not Physically Qualified for SNA (Student Naval Aviator), but would consider applying for the SNFO (Student Naval Fight Officer) program.

PROVIDER PHONE NUMBER: Indicate **both** DSN and commercial.

12.15 CORNEAL REFRACTIVE SURGERY (PRK/LASIK)

AEROMEDICAL CONCERNS:

Definitions:
Corneal Refractive Surgery (CRS) An eximer laser is used to reshape the anterior corneal surface, thereby reducing refractive error and reliance on spectacles or contact lenses to meet vision standards.

Photorefractive Keratectomy (PRK) Laser energy is applied to the anterior corneal stromal surface after epithelium is temporarily displaced or removed (with ethanol, a brush, brief laser application, or an epi-keratome). No stromal flap is created. PRK variants include custom (wavefront-guided), LASEK (epithelium is preserved), and Epi-LASIK (epithelial flap is created). **Wavefront-guided PRK for designated Class I and Class II aviation personnel is not approved for waiver under the guidelines that are applicable to conventional PRK.**

Laser in-situ keratomileusis (LASIK) A corneal stromal flap is created with a microkeratome or femtosecond laser (Intralase), eximer laser energy is applied to the exposed corneal stromal base, and the stromal flap is repositioned. LASIK variants include custom (waverfront-guided).

CAUTION : Brand names, marketing strategies and technological advances often cause confusion regarding CRS terminology.

Background:
The Navy PRK Aviator Retention Study demonstrated a greater than 90% chance of one eye meeting visual standards without correction, and more than 85% of aircrew no longer requiring corrective lenses while flying after PRK surgery. After PRK treatment at a Navy laser center, about 75% of designated aircrew meet waiver standards to return to duty involving flight after one month and over 99% return by twelve weeks. Complications may include delays in corneal healing, scar formation; quality of vision deficits (halo, glare, contrast sensitivity) and persistent eye discomfort (predominantly eye dryness and minor irritation).
LASIK complications are greatly dependent on surgeon experience and technique. Flap healing and stability, hypesthetic cornea and quality of vision have not been thoroughly characterized in the military aviation environment.

ALL FORMS OF CRS ARE DISQUALIFYING FOR AVIATION DUTY AT THE TIME OF THE SURGICAL PROCEDURE. Designated members who undergo CRS are grounded. Designated members may not return to duty involving flight until a LBFS recommends waiver and issues an aeromedical clearance notice. Waiver standards and request procedures are given below.

FORMS SPECIFIED
1. Aviation CRS (PRK) Request
2. Designated CRS (PRK) Aeromedical Summary Template
3. Applicant or Sel Res or Non-Navy DoD CRS WORKSHEET

4. SF 507/SF-93 Continuation (for all aviation applicant candidates)

WAIVER (PRK/LASIK/Other forms of CRS):

PRK: Waiver may be recommended (WR) for all classes of applicants and designated air warfare personnel who comply with the waiver standard particular to their aviation duty status as elaborated below.

PRK (wavefront-guided): Not currently approved for waiver if performed after 1 July 2006. For those cases performed prior to 1 July 2006, waivers will be considered on a case by case basis; for preoperative refractive error in the range -5.75 to -8.00 (high myopia) or +0.25 to +3.00 (hyperopia) total diopter sphere, the final refraction may be measured no sooner than six months after surgery. For mild to moderate myopia in the range <-5.75, the final post-operative refraction may be measured no sooner than three months after surgery.

LASIK: Waiver shall not be recommended (WNR) for all applicant and designated aviation duty personnel in Classes I and II. Waiver may be recommended (WR) for CLASS III personnel.

ALL OTHER FORMS OF CRS or manipulation including **RK** (radial keratotomy), **LTK** (laser thermal keratoplasty), **ICR** (intracorneal ring) and orthokeratology are PERMANENTLY DISQUALIFYING (CD, WNR) for all air warfare duty Classes I, II and III.

PRE-OP ELIGIBILITY AND POST-OP GUIDELINES FOR CORNEAL REFRACTIVE SURGERY:
Preoperative refractive error: For applicants, preoperative refractive error must not exceed -8.00 to + 3.00 total diopters sphere with no more than 3.00 diopters of cylinder nor 3.50 diopters anisometropia.
Refractive (Visual) Stability Post-PRK: Demonstration of post-operative refractive stability requires comparison of two consecutive manifest refractions. Neither sphere nor cylinder may change by more than 0.50 D in either eye to be considered stable. If the interval change exceeds 0.50 D in either eye, further manifest refractions must be performed at the appropriate interval until stability is demonstrated. Only the final two manifest refractions demonstrating stability should be recorded on the Designated CRS (PRK) Aeromedical Summary Template or the Applicant or Sel Res or Non-Navy DoD CRS WORKSHEET.
Manifest Refraction Interval Waiting Periods : The post-operative manifest refraction stability interval endpoint AND length of the interval itself depends on whether the surgery was done at a Navy laser center or non-Navy DoD laser center as well as on the preoperative refractive error for applicants and selected reserve.

DESIGNATED CLASS I, II, OR III PERSONNEL RECEIVING PRK AT A NAVY LASER CENTER:
The minimum stability interval for designated personnel who receive PRK at a Navy laser center is two weeks. The final post-operative refraction may be measured no sooner than four weeks after surgery. If manifest refraction is stable at four weeks compared to two weeks, vision corrects to the required standard, and quality of vision is acceptable, the member may request waiver as soon as four weeks after PRK.

APPLICANTS AND SELECTED RESERVE AIRCREW TREATED AT ANY LASER FACILITY, *AND* DESIGNATED ACTIVE LIST AIRCREW TREATED ONLY AT A NON-NAVY DOD LASER CENTER:
The minimum stability interval is 30 days.
For pre-operative refractive error in the range plano to -5.50 total diopter sphere (mild-moderate myopia),
the final post-operative refraction may be measured no sooner than three months after surgery.
For preoperative refractive error in the range -5.75 to -8.00 (high myopia) or +0.25 to +3.00 total diopter sphere (hyperopia), the final post-operative refraction may be measured no sooner than six months after surgery.

INFORMATION REQUIRED: Initial waiver requests for history of CRS are single submission as long as the required visual standards for aviation duty continue to be met. This section include specifies the information required for all classes of designated and reserve aviation personnel and aviation applicants.

For all ACTIVE DUTY DESIGNATED Class I, II or III air warfare personnel who desire CRS:
Basic Guidelines/documentation required: All designated air warfare personnel in all classes must submit an Aviation CRS (PRK) Request to the Naval Hospital San Diego Refractive Surgery Center prior to surgery for endorsement and further instructions, regardless of location surgery will be obtained.
Active Duty treated at a Navy laser center:
Class I, II and III personnel may return to duty involving flight as soon as four weeks after surgery, but only if vision and refractive stability standards are met. The minimum time period between consecutive refractions is two weeks and the refraction may not change by more than 0.50 D of sphere or cylinder in either eye. Restriction to home base for aircrew duty is prudent while post-operative topical eye medication is still in use.
Waiver submission must be completed using the Designated CRS (PRK) Aeromedical Summary Template. This template is an Excel spreadsheet with embedded logic. If completed with the embedded logic intact, the form automatically advises a favorable or unfavorable waiver recommendation. Following review and endorsement by two local flight surgeons, and an eye care professional (ophthalmologist or optometrist) and concurrence of the commanding officer, the CRS/PRK AMS template may serve as a LBFS and a 90-day aeromedical clearance notice may be issued. Submit the completed CRS AMS in accordance with the instructions located on the top of the form. When the BUPERS/CMC or other granting authority waiver letter arrives, it should be placed in the health record and in the NATOPS jacket. A "waiver granted" up chit of normal duration may be issued after BUPERS/CMC has granted the waiver.
NOTE: The CRS Aeromedical Summary Template is only used for Active Duty treated at a Navy laser center.
Active Duty treated at a non-Navy DoD laser center:
Must meet the same criteria and submission requirements as applicants (see below). May apply for waiver no sooner than three or six months after surgery depending severity of the preoperative refractive error as discussed above.

WARNING: Designated air warfare personnel in active duty status treated at a non-DoD (i.e. civilian or foreign host country) laser center will not be recommended for waiver. (Selected reservist personnel may be treated at non-DoD facilities at their own risk: see below) Failure to submit an Aviation CRS (PRK) Request or failure to follow other procedures may result in permanent disqualification.

Class III treated with LASIK at a DoD laser center:
Class III eligible to receive LASIK at any DoD laser center must meet the same requirements and submission criteria of applicants and may apply for waiver no sooner than three or six months after surgery depending severity of the preoperative refractive error as discussed above. Additionally, for Class III treated with LASIK, documentation must include explicit measures (pachymetry) of residual corneal stromal flap bed depth (usually this is part of the operative report). A bed depth of less than 250 microns shall not be recommended for waiver.

SELECTED RESERVE:

Selected Reserve (Class I) designated aviators electively requesting PRK surgery
Selected reserve (Class I) designated aviators who obtain wish to obtain PRK at their own risk and expense from civilian sources of care risk permanent disqualification. An Aviation CRS (PRK) Request must be submitted before CRS surgery. Approval to proceed requires written permission from the unit commander, unit flight surgeon, and NAMI Ophthalmology. PRK is an elective procedure and is NOT recommended for Selected Reservists whose vision meets aviation standards by use of corrected lenses because of the risk of permanent disqualification.

Selective Reserve (Class II and III) designated aviators electively requesting PRK surgery
Selective reserve (Class II and III) designated aviators must meet the same criteria and submission requirements as applicants. Refer to the applicant section below for detailed instructions. Waiting period following surgery and stability interval are the same as for SNA/SNFO applicants with mild to moderate myopia, high myopia or any hyperopia.

FOR APPLICANTS and SELECTED RESERVE and ACTIVE DUTY TREATED AT A NON-NAVY DOD LASER CENTER:

Applicants, Selected Reserve and Active Duty treated at a non-Navy DoD laser center:
Applicants, Selected Reserve and Active Duty treated at a non-Navy DoD laser center must submit copies of all records pertaining to PRK surgery including the pre-operative evaluation, operative notes (laser computer printouts), and all post-operative notes including documentation of the manifest refractions and post-op cycloplegic refraction at appropriate intervals must be submitted along with the applicant physical exam.
A completed Applicant or Sel Res or Non-Navy DoD CRS WORKSHEET and a SF 507/SF-93 Continuation form must accompany the request for waiver**. For applicants only:** PRK may be performed at any military or civilian laser center.
Refractive (visual) stability: Post-operative refractive stability is demonstrated by two consecutive manifest refractions separated by at least one month. Neither sphere nor cylinder may change by more than 0.50 D in either eye to be considered stable. Only the final two manifest refractions demonstrating stability should be recorded on the Applicant or Sel Res or Non-Navy DoD CRS WORKSHEET.
Refraction Interval Waiting Periods: The minimum interval between surgery and final post-operative refraction is as follows:
If pre-operative refraction is Plano to -5.50 total diopter sphere (mild-moderate myopia)

Then, the final post-operative refraction may be accomplished no sooner than three months after surgery.
If preoperative refraction is -5.75 to -8.00 (high myopia) or +0.25 to +3.00 total diopter sphere (hyperopia) Then, the final post-operative refraction may be accomplished no sooner than six months after surgery.
The minimum time interval between consecutive refractions (to demonstrate stability) is 30 days.
Post-operative cycloplegic refraction: A post-operative cycloplegic refraction with date must be reported for all SNA, SNFO and all other Class II applicants.
CAUTION: Applicants must be free of visual symptoms and have discontinued all medication related to eye surgery.
NOTE: History of PRK does not guarantee qualification for aviation duties. Pre-operatively the applicant must meet all other vision standards appropriate to his or her class of duty. Post-operatively the applicant must continue to meet these standards. Post-PRK SNA's must meet manifest and cycloplegic standards for refractive error. SNFO must meet manifest standards for refractive error. There are no refractive limits for non-SNFO class II applicants.
Class III Applicants (LASIK) :
LASIK is approved for Class III applicants. Submit all documentation required for applicants as noted above. If applicant received LASIK submission must include explicit measures (pachymetry) of residual corneal stromal flap bed depth (usually this is part of the operative report). A bed depth of less than 250 microns shall not be recommended for waiver.
References:
1. BUMED 051824Z DEC 01 LASER EYE SURGERY PRK IN NEW ACCESSIONS TO NAVY AND MARINE CORPS/AVIATION CLINICAL STUDY CHANGE IN STUDY ENROLLMENT CRITERIA.
2. BUMED WASHINGTON DC 261240Z FEB 02 AVIATION CLINICAL STUDY CHANGES IN STUDY ENROLLMENT CRITERIA.
3. ALNAV 047/01 112050Z MAY 01 AVIATION VISION STANDARDS CHANGE.

ICD-9 CODES:
P11.99 PRK or LASIK

12.16 STUDENT NAVAL AVIATOR CONTACT LENS POLICY

Major Changes :
1. Student Naval Aviator (SNA) Applicants may meet the vision requirements of the SNA program with the use of soft contact lenses.

AEROMEDICAL CONCERNS : Photorefractive keratectomy (PRK) has thus far proven to be an acceptable procedure for entrance into the SNA program. Student Naval Aviator Applicants must meet the visual requirements outlined below. USNA students are eligible for PRK through the Navy Medical Treatment Facilities. NROTC and OCS personnel are required to undergo PRK in the civilian sector at their own expense should they desire vision correction.
Properly fit soft contact lenses (SCL) allow for a similar reduction in the refractive error. Class I, II, III are currently allowed to wear contact lenses in the performance of their aviation duties. This contact lens program originally designed for designated aviation personnel has met great success. There is no waiver requirement for designated aviators who meet the requirements and guidelines of the USN/USMC SCL Program.
SNA Applicants: SNA applicants with excessive refractive error and disqualifying uncorrected distant visual acuity (UCDVA), no worse than 20/400, who demonstrate successful fit and habitual wear (at least six months) of approved soft contact lenses and meet all other visual standards can apply for a waiver. Uncorrected Visual Acuity (UCVA) should be measured by the Armed Forces Vision Tester (AFVT), Optec 2300, B-VAT, or similar charts with multiple 20/400 letter capabilities. Using the Snellen 20/200 "E" is not an acceptable method of assessing uncorrected visual acuity of 20/400. A history of successful contact lens wear does not guarantee the granting of waiver.
Medical Requirements :

1. No history of ocular, periocular or medical condition that would require or contraindicate SCL wear, including giant papillary conjunctivitis and keratitis sicca or other dry eye syndrome.
2. Uncorrected distance visual acuity of no worse than 20/400 in each eye with multiple presentations.
    a. **CAUTION:** If uncorrected distance visual acuity is worse than 20/400 at any point in an aviator's career- they are NPQ for Duty Involving Actual Control of the Aircraft.
3. Visual acuities at distance of 20/20 -0, by Goodlite letters, with spectacle correction , immediately after removing SCL.
4. Visual acuities of 20/20 -0, by Goodlite letters, while wearing SCL.
5. Best Corrected Visual Acuities, at near, of 20/20 in each eye.
6. Refractive error of no more than -8.00D of myopia, +3.00D of hyperopia, -3.00D of astigmatism, -3.50D of anisometropia or any total refractive error of -8.00D or +3.00D along any one meridian. These refractive standards are only to ensure that the applicant is eligible for a waiver after PRK surgery.
    a. **CAUTION:** Merely meeting the refractive standards above **in no way** guarantees that the applicant can also meet the uncorrected distance vision requirement of 20/400.

7. Free of visual symptoms such as fluctuating vision, reduction in vision at night or under glare conditions and/or discomfort symptoms with contact lens use.
8. An over-refraction, with contact lenses on, of no more than +/-0.50 diopters.
9. Must meet all other requirements of SNA applicants of depth perception, color vision, phorias and intraocular pressures.

INFORMATION REQUIRED AND WAIVER PROCESS:

1. Use the SNA Contact Lens Checklist as a guideline to the requirements. The SNA Contact Lens Checklist must be completed by a military Ophthalmologist or Optometrist.
2. The applicant must remove the contact lenses thirty (30) days prior to the physical examination.
3. Applicants must wait for a minimum of six months after an initial contact lens fit before the physical examination.
4. A copy of a "pre-fit" manifest refraction, contact lens parameters, and proof of adequate six-month follow-up care must be submitted for waiver consideration.
5. At the time of waiver consideration, an Aviation PRK consult will be completed in the event that the SNA can no longer wear SCL successfully. If the SNA is later deemed not adaptable to successful contact lens wear, the continuation of the waiver will be denied.
6. Submit the SNA Contact Lens Checklist with the applicant SF-88 with all records pertaining to the contact lens fit.

APPROVED SOFT CONTACT LENSES (SCLS): Only nationally available, FDA approved, disposable or frequent replacement lenses are allowed for SNA applicants under this waiver. Lenses must be replaced at least every month. SCLs are not to be worn overnight while in flight training or flight status unless in actual combat operations requiring sleep deprivation. Cosmetically tinted SCLs are not allowed, but lenses may have a handling or visibility tint. Hard or Rigid Gas Permeable (RGP), combination of hard and soft contact lenses and/or bifocal/multifocal contact lenses are not approved for any SNA applicant. SCLs worn for therapeutic reasons other than refractive error, such as keratoconus, basement membrane dystrophies, or other ocular conditions are not authorized.
For any other questions regarding specific brands of contact lenses or waiver issues, please contact NAMI Ophthalmology Department.

DISCUSSION: The intent of the SNA Contact Lens Waiver is to allow applicants who are successful long term wearers of soft contact lenses the opportunity to apply for Naval Aviation without surgery. Not all applicants will successfully meet the demanding criteria for the Contact Lens Waiver.

FORMS:
SNA Contact Lens Worksheet
Aviation CRS Consult

Student Naval Aviator Applicant Contact Lens Waiver Checklist

This checklist is intended to insure that all required information is included with a waiver application. **Any missing information or documentation will result in automatic disapproval of the waiver request**.

REQUIRED INFORMATION:

□ Copy of initial Contact Lens Fit with manifest refraction (more than 7 months prior to today) (Civilian optometrist/ophthalmologist exam is OK)

□ Copy of 6 month Contact Lens follow-up visit (Civilian optometrist/ophthalmologist exam is OK)

□ Copy of Aviation PRK Consult

CONTACT LENS WAIVER EVALUATION EXAM

Must be performed by a military optometrist or ophthalmologist

Date:

□ Contact lenses removed for 1 month prior to today's visit:
CL Last worn on: _____

□ Pt states no problems with glare, fluctuating vision, reduction of vision at night or discomfort problems with contact lens use

□ Uncorrected Distance Visual Acuity (Chart used_____)
OD 20/_____ # correct_____ # of presentations _____

OS 20/_____ # correct_____ # of presentations _____

□ Contact Lens Parameters

	Brand	BC	Dia	Power
OD				
OS				

□ Slit Lamp Evaluation:

	Assessment of CL fit	Ocular Health
OD		
OS		

□ Distance Visual Acuity with Contact Lenses Must use 10 Goodlite Letters at 20 feet
OD 20/_____ # correct_____ out of 10

OS 20/_____ # correct_____ out of 10

Student Naval Aviator Applicant Contact Lens Waiver Checklist

□ Near Visual Acuity with Contact Lenses
OD 20/_____

OS 20/_____

□ Contact Lenses removed and visual acuity taken immediately with spectacles
□ Distance Visual Acuity with spectacles Must use 10 Goodlite Letters at 20 feet
OD 20/_____ # correct_____ out of 10

OS 20/_____ # correct_____ out of 10

□ Near Visual Acuity with spectacles
OD 20/_____

OS 20/_____

□ Spectacle Rx
OD

OS

_____ _____
Name of Optometrist or Ophthalmologist Telephone

_____ _____
Name of Flight Surgeon Telephone

If there are any questions about this checklist- please refer to the NAMI Aeromedical Waiver Guide or contact the NAMI Ophthalmology department.

COMM 850-452-2257 x 1052 or 1019
DSN 922-2257 x 1052 or 1019

Point of contact:
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